

WHAT IS CLAIMED IS:

1. A method of measuring the physical and chemical properties of biological tissue or cells for observing the influence that a change of the physical and chemical environment surrounding the biological tissue or cells has on the physical and chemical properties of the biological tissue or cells, wherein the physical and chemical environment surrounding the biological tissue or cells are held constant, then the physical and chemical environment is arbitrarily changed, the physical and chemical properties of the tissue or cells are observed, and the physical and chemical properties of the tissue or cells before and after the change of the physical and chemical environment are compared.

2. The method of claim 1 using a device that comprises at least a cell culture system, an environmental adjustment system, an observation system and a comparison system, and comprising the steps of:

(A) culturing the tissue or cells with the cell culture system, or maintaining a first physical and chemical environment near the tissue or cells with the cell culture system,

(B) observing the first physical and chemical properties of the tissue or cells in the first physical and chemical environment with the observation system,

(C) changing the first physical and chemical environment into a second physical and chemical environment with the environmental adjustment system,

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(D) observing the second physical and chemical properties of the tissue or cells in the second physical and chemical environment with the observation system, and

(E) comparing the first physical and chemical properties of the tissue or cells to the second physical and chemical properties of the tissue or cells with the comparison system.

3. The method of claim 2, wherein the process of changing the first physical and chemical environment into a second physical and chemical environment comprises the replacement of a first culture medium used in the cell culture system with a second culture medium used in the cell culture system.

4. The method of claim 3, wherein the first and the second culture medium comprise one or more medicines of arbitrary concentration.

5. A measurement device for measuring physical and chemical properties of biological tissue or cells to observe the influence that a change of the physical and chemical environment surrounding the biological tissue or cells has on the physical and chemical properties of the biological tissue or cells, comprising:

(A) a cell culture system for culturing the tissue or cells, or maintaining a physical and chemical environment near the tissue or cells,

(B) an observation system for observing the physical and chemical

properties of the tissue or cells in the first physical and chemical environment,

(C) an environmental adjustment system for adjusting the physical and chemical environment maintaining the tissue or cells,

(D) an observation system for observing the physical and chemical properties of the tissue or cells after the first physical and chemical environment has been changed into a second physical and chemical environment with the environmental adjustment system, and

(E) a comparison system for comparing the physical and chemical properties of the tissue or cells in the first physical and chemical environment to the physical and chemical properties of the tissue or cells in the second physical and chemical environment.

6. The measurement device of claim 5, wherein the environmental adjustment system comprises a system for adding chemical substances, microorganisms or viruses to the culture medium used by the cell culture system, and a system for replacing a first culture medium comprising one or more chemical substances, microorganisms or viruses of arbitrary concentration used by the cell culture system with a second culture medium comprising one or more chemical substances, microorganisms or viruses of arbitrary concentration used by the cell culture system.

7. The measurement device of claim 5, wherein the environmental adjustment system comprises a system for adding substances to a culture

medium used by the cell culture system, and a system for replacing a first culture medium used by the cell culture system with a second culture medium used by the cell culture system.

8. The measurement device of claim 5, wherein the observation system is an electric potential measurement device for the measurement of the electrophysiological properties of the tissue or cells, and this device comprises:

(A) an integrated cell placement device comprising (a) a plurality of microelectrodes on a substrate, (b) a cell placement portion for placing the tissue or cells on the microelectrodes, and (c) an electrical connector for applying an electric signal to the microelectrodes and deriving an electric signal from the microelectrodes, and

(B) a processing system for processing the output signal produced by the electrophysiological activity of the tissue or cells connected with the electrical connector of the integrated cell placement device.

9. The measurement device of claim 8, wherein the electric potential measurement device further comprises a system for applying an electric stimulus to the tissue or cells connected with an electrical connector of the integrated cell placement device.

10. The measurement device of claim 8, wherein the physical and chemical properties of a plurality of tissue or cell samples can be measured

while culturing those samples with a plurality of integrated cell placement devices.

11. The measurement device of claim 10, wherein the plurality of integrated cell placement devices comprise an environmental adjustment system for individual adjustment of the physical and chemical environment of the tissue or cell samples.

12. A method of testing medicines, which comprises:

providing a detector for detecting the electrical properties of tissue or cells to which chemical substances, microorganisms or viruses have been added;

providing an image detection system for observing the visible properties of the tissue or cells from outside;

measuring the electrical or visible properties of the tissue or cells when chemical substances, microorganisms or viruses have been added to the tissue or cells; and

judging from those two properties whether the added chemical substances, microorganisms or viruses have had an influence on the tissue or cells.

13. A medicine testing device, comprising

an electrical measurement portion for the measurement of the electrical properties of tissue or cells to which chemical substances,

microorganisms or viruses have been added, and

a visible properties detection portion for the measurement of visible properties of the tissue or cells,

wherein the influence that the chemical substances, microorganisms or viruses have on the tissue or cells can be measured from the output of the electrical measurement portion and the visible properties detection portion.

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